

ods and the genetics of maize, which is genetically our best known plant and probably the one in which breeding has so far obtained the greatest improvements. Chapters XVI and XVII discuss controlled pollination and seed production methods. The former includes a good section on the part played by incompatibilities and sterilities in breeding problems. The last five chapters deal with the standard methods of treating and analyzing data. A bibliography, glossary of terms, and appendix of statistical tables complete the book.

*Methods of Plant Breeding* could hardly have appeared at a more opportune time. The plant breeder is to-day faced with what is at once a challenge and a golden opportunity. Regardless of how long or short the "duration" may be this country must for some years to come produce both foodstuffs and other plant materials to supply not only ourselves and our allies but later all those peoples of the world whose lands have been devastated by war. This program will necessitate further improvements in our main crop plants, and the cultivation of many crops new to our agriculture. The endeavor will be a tremendous one and this book should prove a valuable guide to those entrusted with its breeding problems.

Finally it should be pointed out that several times the authors emphasize that progress in the field, and its attendant benefits to mankind, depend to a large extent upon free exchange of ideas and materials among workers at different stations and in different nations. This thought is one which it is to be hoped will permeate fields far greater in scope than that of plant breeding.

BARNARD COLLEGE,  
COLUMBIA UNIVERSITY

W. GORDON WHALEY

### Apache-state Flora

Flowering Plants and Ferns of Arizona. By T. H. Kearney and R. H. Peebles (and collaborators). Pp. 1,069, illustrated (29 plates and frontispiece) and indexed. U. S. Dept. of Agriculture Misc. Publ. 423. May, 1942. \$2.00.

This, the second volume to appear in the last two years that can be truly called a state Flora, takes its place alongside Deam's *Flora of Indiana* as an example for authors of future state Floras to emulate. The differences, other than format and general plan, between these two state Floras are primarily due to the fact that while

Kearney and Peebles have *studied* the Arizona plants, Deam has *lived with* those of Indiana. This statement is in no sense a reflection upon the Arizona authors and their comprehensive survey of their state's vegetation; it is merely a summation of the differences in "flavor" between the two volumes.

Certain of the families and genera of included plants, as in Deam's Flora, have been treated by recognized experts in these groups; in this respect, as well as others, one may justifiably say that the authors approached their problem in the "modern" systematic manner. Well written—that is as well written as any manual, consisting primarily of keys, species-descriptions and records of distribution, can be written—and rather adequately illustrated with definitely good photographs, the Flora also contains an interesting discussion of the mantle of vegetation which, though torn and frayed by climate and topography, covers Arizona. To one who is addicted to maps as an aid to the interpretation of vegetational studies, a detailed map of the state, showing the major floristic areas and accompanying F. Shreve's discussion of vegetation types, is a desideratum which might well have been included. An outline map giving county limits, larger rivers and principal localities is a multiple guidepost to the "visitor" who dips into the book.

Among the more interesting facts presented, at least to one whose inclination is also toward things phytogeographic, is the presence in Arizona of two ferns, *Asplenium exiguum* and *Cetararch dalhousiae*. The isolated Arizona stations listed, together with a few localities for the former in northern Mexico, constitute the known western hemisphere records of these two species whose primary distribution is the Himalaya Mts., elsewhere in eastern Asia, and Abyssinia.

As an indication of the scope and complexity of the flora of Arizona, approximately 3,200 species, representing 128 families, are treated, and the estimate is made that when the state is completely explored the total may well be more than 3,500 species. The diversity of vegetation is due to several factors; among them the altitudinal range and climatic variation, and the resultant complexity of ecological habitats, within the state, as well as the number of primary vegetation-centers from which the components of the Arizona flora have come.

All in all, then, the *Flowering Plants and Ferns of Arizona* is a splendid contribution to North American botany. One can only regret that in so few of these United States has the flora been so thoroughly studied and so precisely depicted; it seems scarcely necessary to say that the total complexities and coherence of the vegetation of our country cannot be grasped so long as the distribution of a majority of its component elements, within so many of the states, is adequately known.

CHARLES L. GILLY

NEW YORK BOTANICAL GARDEN,  
NEW YORK, N. Y.

### Algae for Undergraduate Students

An Introduction to the Study of Algae. By V. J. Chapman. Pp. 387. The Macmillan Company. 1941. \$3.75.

In the present volume the author has attempted to prepare a short and relatively elementary text on phycology for undergraduate students, hitherto available treatises being too unwieldy and comprehensive for such a purpose. The method of presentation, is in general, the "type-method" in which one or more genera are selected to illustrate the characters of each family. The book is divided into fourteen chapters, including general chapters on classification; reproduction, evolution and fossils; physiology, symbiosis and soil algae. Four chapters are devoted to ecology and distribution, and seven deal with the morphology of the type genera, families, orders and classes. References to important original sources are included at the conclusion of each chapter. The logic of including the Conjugales and Charales of the Chlorophyceae in the same chapter with the Xanthophyceae, Bacillariophyceae, Chrysophyceae, Cryptophyceae and Dinophyceae may be challenged in some quarters.

Some curious inaccuracies pervade the book. For example: the plural of flagellum is given as "flagellae" throughout the text. On page 63, the Chaetophorales are referred to as a "family." On page 72 it is implied that the oogonium of *Coleochaete scutata* possesses a trichogyne. It is stated on page 102 that in *Spirogyra* "meiosis takes place when the zygote germinates." "*Elachista*" is written for "*Elachistea*" on page 145; the single egg of *Desmarestia* is referred to as "ova" in figure 114. On page 30 species of *Oedogonium* with